

Response to September 28, 2007 Office Action  
Serial No. 10/643,682

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1. (currently amended) A chemical treatment method comprising:

(a) providing a material comprising a first metal film formed on a substrate and a second metal film formed on said first metal film, said first metal film being formed from a metal selected from the group consisting of chromium, titanium, tungsten, palladium and molybdenum, or an alloy thereof;

(b) forming a predetermined pattern on the second metal film ~~[[to]]~~ by selectively remove removing a portion of the second metal film, whereby an exposed portion of the first metal film from which the portion of the second metal film which is removed ~~being is~~ passivated to form a passivated portion;

(c) immersing said material and a positive electrode in an acidic reduction treatment solution containing an

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acid radical and performing an electrolysis reduction process by applying a negative voltage to said material and applying a positive voltage to said positive electrode, ~~whereby nascent hydrogen for the first metal film to reduce~~ reduces said passivated portion to said first metal film; and

(d) etching the first metal film by contacting the exposed portion with an acidic etching treatment solution to form the predetermined pattern on the first metal film.

Claim 2. (previously presented) A method according to claim 1, whereby in step (c), the acidic reduction treatment solution comprises a compound selected from the group consisting of hydrochloric acid, sulfuric acid, carboxylic acid, hydrofluoric acid and phosphoric acid.

Claim 3. (canceled)

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Claim 4. (previously presented) A method according to claim 1, wherein the acidic etching treatment solution contains a chloride ion.

Claim 5. (currently amended) A chemical treatment method comprising:

(a) providing a material comprising a first metal film formed on a substrate and a second metal film formed on said first metal film, said first metal film being formed from a metal selected from the group consisting of chromium, titanium, tungsten, palladium and molybdenum, or an alloy thereof;

(b) forming a predetermined pattern on the second metal film ~~[[to]]~~ by selectively remove removing a portion of the second metal film, whereby an exposed portion of the first metal film from which the portion of the second metal film which is removed being is passivated to form a passivated portion;

(c) immersing said material and a positive electrode in a reduction treatment solution containing a halogen ion and performing an electrolysis reduction process by applying

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a negative voltage to said material and applying a positive voltage to said positive electrode, whereby nascent hydrogen for the first metal film to reduce reduces said passivated portion to said first metal film; and

(d) dipping said material into an acidic etching treatment solution so that the exposed portion is in contact with said acidic etching treatment solution to form the predetermined pattern on the first metal film.

Claim 6. (previously presented) A method according to claim 1, wherein the acidic etching treatment solution contains a halogen ion.

Claim 7. (previously presented) A method according to claim 6, wherein the halogen ion in the acidic etching treatment solution is a chloride ion.

Claim 8. (canceled)

Claim 9. (previously presented) A method according to claim 1, wherein the first metal film is chromium.

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Claim 10. (previously presented) A method according to claim 1, wherein the first metal film is an alloy of chromium.

Claims 11 to 24. (canceled)

Claim 25. (previously presented) A method according to claim 5, wherein the halogen ion in the reduction treatment solution is a chloride ion.

Claim 26. (canceled)

Claim 27. (previously presented) A method according to claim 1, wherein the first metal film comprises a nickel chromium alloy.

Claims 28 and 29. (canceled).

Claim 30. (withdrawn) A chemical treatment method by which a metal film formed on a substrate is etched into a predetermined pattern comprising:

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(a) providing a material comprising a first metal film coated on a substrate and a second metal film formed on said first metal film, said first metal film having a metal passivated layer on an exposed surface thereof, said first metal film being formed from a metal selected from the group consisting of chromium, titanium, tungsten, palladium and molybdenum, or an alloy thereof, said second metal film having a predetermined pattern,

(b) immersing said material and a positive electrode in an alkaline reduction treatment solution containing a halogen ion, connecting the positive electrode and a metal portion of said material to an electrolytic circuit such that said material is a cathode and applying an electric current to the cathode and the positive electrode to carry out an electrolysis, thereby producing nascent hydrogen, whereby said nascent hydrogen reduces said metal passivated layer to said first metal or an alloy thereof; and then

(c) etching the first metal film by contacting an exposed portion of said first metal or an alloy thereof with an acidic etching treatment solution to form the predetermined pattern.

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Claim 31. (withdrawn) A method according to claim 30, wherein in step (b), the alkaline reduction treatment solution which contains a halogen ion is selected from the group consisting of sodium chloride solution, potassium chloride solution and potassium iodide solution.

Claim 32. (withdrawn) A method according to claim 31, wherein the alkaline reduction treatment solution which contains a halogen ion is potassium chloride solution.

Claim 33. (withdrawn) A method according to claim 30, wherein the first metal film is chromium.

Claim 34. (withdrawn) A method according to claim 30, wherein the first metal film is an alloy of chromium.

Claim 35. (withdrawn) A method according to claim 30, wherein the first metal film comprises a nickel chromium alloy.

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Claim 36. (previously presented) A method according to claim 1, wherein the passivated portion is an oxide layer.

Claim 37. (previously presented) A method according to claim 1, wherein the positive electrode is a plate.

Claim 38. (previously presented) A method according to claim 5, wherein the acidic etching treatment solution contains a halogen ion.

Claim 39. (previously presented) A method according to claim 38, wherein the halogen ion in the acidic etching treatment solution is a chloride ion.

Claim 40. (previously presented) A method according to claim 5, wherein the first metal film is chromium.

Claim 41. (previously presented) A method according to claim 5, wherein the first metal film is an alloy of chromium.



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Claim 42. (previously presented) A method according to claim 5, wherein the halogen ion in the reduction treatment solution is a chloride ion.

Claim 43. (previously presented) A method according to claim 5, wherein the first metal film comprises a nickel chromium alloy.

Claim 44. (previously presented) A method according to claim 5, wherein the passivated layer portion is an oxide layer.

Claim 45. (previously presented) A method according to claim 5, wherein the positive electrode is a plate.